Aleksandr Aravkin   Curriculum Vitae

CONTACT INFORMATION	University of Washington	*Office:* Lewis Hall 317
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	P.O. Box 353925, Seattle, WA 98195	*E-mail:* saravkin@uw.edu

RESEARCH FOCUS

My research combines statistics, continuous optimization, and variational analysis. With students and collaborators, we develop new formulations and methods for data science, machine learning, and inverse problems, with applications across physical and health sciences.

MATH SCIENCES AT IHME

As director of math sciences at the Institute for Health Metrics and Evaluation, I lead a research group that develops new scientific methods used across the institute, and disseminate solutions code using open source repositories and top journals/conferences. Beginning in 2020, the math sciences team developed models used for the Covid-19 forecast: `covid19.healthdata.org/`.

PUBLICATIONS SUMMARY

- 61 peer-reviewed journal papers, including Lancet, Nature Medicine, HSR, MOR, JCGS, JMLR, EJS, SIAM {OPT, CON, AP, SC, IMS}, IEEE {Access, TAC, TIT, TCI, TSP}, MathProg, Automatica, Inverse Problems, ML, AIAA, Pediatrics, and Neural Computation.
- 52 peer-reviewed proceedings, including ICML, UAI, RSS, CDC, MLSP, ICASSP, and IFAC.

EDUCATION

Ph.D., Mathematics, 2010, University of Washington. Advised by J.V. Burke.

M.S., Statistics, 2010, University of Washington.

B.S., Mathematics and Computer Science, 2004, University of Washington.

APPOINTMENTS

University of Washington

2020 —	:	*Director of Mathematical Sciences*, Institute for Health Metrics and Evaluation (IHME)
2019 —	:	*Associate Professor of Applied Mathematics.*
	:	*Adjunct Associate Professor of Statistics, Health Metrics Sciences, and Mathematics.*
2015 - 2019	:	*Assistant Professor of Applied Mathematics.*
	:	*Adjunct Assistant Professor of Statistics and Mathematics.*

Columbia University, Computer Science & IEOR

2014 - 2015	:	*Adjunct Professor.* Taught graduate courses in machine learning and high dimensional data analysis, with focus on optimization, scientific computing, and statistical modeling.

IBM Thomas J. Watson Research Center

2013 - 2015	:	*Research Staff Member.*

University of British Columbia, Computer Science and Earth/Ocean Sciences.

2010 - 2012	:	*Postdoctoral Fellow.*

CONSULTING

Consult with clients in law and industry on statistical and computational methodology:

- US. Attorney's Office: worked with Dr. Nayak Polissar on probabilistic calculations related to a criminal case, 2020.
- Bill and Melinda Gates Foundation: developed computational methodology for HIV biomarker discovery, 2019.

HONORS   Data Science Fellow of the University of Washington eScience Institute, 2016-2021.

Washington Research Foundation Data Science Professor, 2015-2020.

16 IBM Invention Achievement Awards, 2013-2015.

IBM Representative for Singapore Global Young Scientist Summit, 2014.

SOFTWARE   Manage/distribute code via Github `github.com/UW-AMO` (Applied Modeling and Optimization) and `github.com/ihmeuw-msca` (Math Sciences team at IHME).

SUPERVISION   *University of Washington, 2015-2021:*

- IHME Team Lead (9): Bradley Bell (Principal Mathematician), Peng Zheng (Acting Assistant Professor), Kelsey Maass (Postdoctoral Fellow), Gregory Anderson (Senior Engineer), Reed Sorensen (Researcher), Marlena Bannick, Aleksei Sholokhov, Jennifer Brennan, Jaiwei He (Research Associates).
- Ph.D. Students (12): P. Zheng (2019), D. He (2019), J. Zhang (2020), J. Jonker (2020), K. Maass (2021), R. Baraldi, N. Lee, R. Levin, A. Sholohov, K. Liu, O. Dorabiala, J. Stevens-Haas.

SERVICE   2014-2021: Organize conferences at UW including West Coast Optimization Meeting (WCOM) 2019, Data Science Summit (2019), AMATH 50th Anniversary Conference (2019), and symposia/sessions at top conferences including SIAM Optimization 2021, PIMS workshop on Computational Math (UBC 2019), SIAM Optimization 2017, SIAM 2016, Internat. Symp. on Math. Prog. (2015), SIAM Comp. Sci. and Eng. (2015), and Neural Info. Proc. Sys. (NIPS) (2014).

2017-2020: Served on the Applied Computational and Mathematical Sciences (ACMS) committee; help with the admissions process and program development.

2015 - 2021: As Data Science Fellow of eSciences Institute, promote interdisciplinary research for data driven innovation across U. Washington; mentor ongoing Data Science Incubator research; guide curriculum development related to Data Science degree options.

2014-2015: While at IBM, facilitated academic integration with industrial research as adjunct professor at Columbia by designing and teaching three broad impact masters courses to 100+ students (Advanced Machine Learning, High Dimensional Analysis, and Data Mining).

SUPPORT

1. Bill & Melinda Gates Foundation (OPP1152504) Murray (PI) 07/2017 – 06/2027 IHME Global Public Goods: Global Burden of Disease, Forecasting, and Resource Tracking. *Role: Director of Mathematical Sciences.*
2. National Institute of Minority Health Disparities (75N94019C00016) Dwyer-Lindgren/Murray (MPIs) 09/25/2019 – 09/24/2022 U.S. Burden of Health Disparities by Race/Ethnicity, Sex, Socioeconomic Status, Age and Location. *Role: Team Lead.*
3. Boeing Data Science Research grant. $ 2M. 1/2019 — 12/2019. *Role: Co-PI and Team Lead.*
4. TRIPODS+X, Foundational Training in Neuroscience and Geoscience via Hackweeks, $177,058. Summer 2019. *Role: Co-PI.*
5. NSF 1853371, (Conference) Applied Mathematics: The Next 50 Years. $37,494. *Role: Co-PI.*
6. Pacific Institute of the Mathematical Sciences (PIMS) Collaborative Research Grant, $200,000 CAD. 04/01/2018 — 03/31/2021. *Role: Co-PI.*

TEACHING   *University of Washington, Applied Mathematics, 2015-:*

- Graduate education and course development:
  - Amath 481/581: Scientific Computing, including numerical methods for ODEs/PDEs.
  - Developed and taught Amath 521, *Machine Learning for Computational Finance.*

– Developed and taught Amath 515: *Fundamentals of Optimization.*

- Undergraduate education and course development:

  – Jointly developed and taught Statistics and the Law (Amath 490) in 2018.

  – Taught Amath 352 (Linear Algebra) and Amath 351 (Differential Equations).

Columbia University, CS & IEOR: 2014-2015: Taught three masters courses offering foundations in statistical modeling and algorithms for sparse regression, low rank recovery, and machine learning.

BOOKS AND BOOK
CHAPTERS

B4. A. Aravkin, A. Choromanska, L. Deng, G. Heigold, T. Jebara, D. Kanevski, and S.J. Wright. *Log-linear models, extensions, and applications.* Edited volume, MIT Press.

B3. A. Aravkin, A. Choromanska, T. Jebara, D. Kanevsky. *Semistochastic quadratic bound methods*, in Log-Linear Models, extensions, and applications, MIT Press.

B2. A. Aravkin and S. Becker. *Dual Smoothing and Level Set Techniques for Variational Matrix Decomposition.* In Robust Low-Rank and Sparse Matrix Decomposition: Applications in Image and Video Processing, editors T. Bouwmans, N. Aybat, E. Zahzah, 2016 (S-38).

B1. A. Aravkin, J. Burke, and G. Pillonetto. *Optimization viewpoint on Kalman smoothing, with applications to robust and sparse estimation.* In Compressed Sensing and Sparse Filtering, 237-280. Springer, 2014.

PEER REVIEWED
JOURNAL ARTICLES

J61. B. de Silva, J. Callaham, J. Jonker, N. Goebel, J. Klemisch, D. McDonald, N. Hicks, J.N. Kutz, S.L. Brunton, A.Y. Aravkin. *A Hybrid Learning Approach to Sensor Fault Detection with Flight Test Data.* To appear in AIAA Journal, Accepted 2021.

J60. S. Brunton, J.N. Kutz, K. Manohar, A. Aravkin, K. Morgansen, J. Klemisch, N. Goebel, J. Buttrick, J. Poskin, A. Blom-Schieber, T. Hogan, D. McDonald. *Data-Driven Aerospace Engineering: Reframing the Industry with Machine Learning.* To appear in AIAA Journal, Accepted 2021.

J59. K. Causey et al. *Estimating global and regional disruptions to routine childhood vaccine coverage during the COVID-19 pandemic in 2020: a modelling study.* The Lancet (2021), doi: https://doi.org/10.1016/S0140-6736(21)01337-4. Published July 2021.

J58. M. Balaj et al. *Parental education and inequalities in child mortality: a global systematic review and meta-analysis.* The Lancet (2021), doi: https://doi.org/10.1016/S0140-6736(21)00534-1. Published June 2021.

J57. G. Abrevaya, G. Dumas, A. Aravkin, P. Zheng, J-C. Gagnon-Audet, J. Kozloski, P. Polosecki, G. Lajoie, D. Cox, S.P. Dawson, G. Cecchi, I. Rish. *Learning Brain Dynamics with Coupled Low-dimensional Nonlinear Oscillators and Deep Recurrent Networks.* Neural Computation (2021): 1-40. Published May 2021.

J56. J. L. Dieleman et al. *Estimating health care delivery system value for each US state and testing key associations.* Health Sciences Research, doi: 10.1111/1475-6773.13676. Published May 2021.

J55. T. van Leeuwen, A. Aravkin. *Variable Projection for Nonsmooth Problems.* Siam Journal of Scientific Computing (SISC), (2021): S249-S268.

J54. A. Scampicchio, A. Aravkin, G. Pillonetto. *Stable and Robust LQR Design via Scenario Approach.* Automatica 129 (2021): 109571.

J53. A. Aravkin, J. V. Burke and D. He. *On the Global Minimizers of Real Robust Phase Retrieval With Sparse Noise,* in IEEE Transactions on Information Theory, vol. 67, no. 3, pp. 1886-1896, March 2021, doi: 10.1109/TIT.2020.3040959.

J52. P. Zheng, R. Barber, R. Sorensen, C. Murray, and A. Aravkin. *Trimmed Constrained Mixed Effects Models: Formulations and Algorithms.* Journal of Computational and Graphical Statistics (JCGS), 2020 (1-34).

J51. J. Jonker, P. Zheng and A. Aravkin, *Efficient Robust Parameter Identification in Generalized Kalman Smoothing Models,* in IEEE Transactions on Automatic Control, doi: 10.1109/TAC.2020.3042438.

J50. IHME Covid-19 Forecasting Team (methods contributor). *Modeling COVID-19 scenarios for the United States.* Nature Medicine (2020).

J49. GBD 2019 Viewpoint Collaborators (methods contributor & senior author on risks methodology). *Five insights from the Global Burden of Disease Study 2019.* The Lancet (2020).

J48. GBD 2019 Risk Factors Collaborators (senior author). *Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019.* The Lancet (2020).

J47. GBD 2019 Demographics Collaborators (methods contributor). *Global age-sex-specific fertility, mortality, healthy life expectancy (HALE), and population estimates in 204 countries and territories, 1950–2019: a comprehensive demographic analysis for the Global Burden of Disease Study 2019.* The Lancet (2020).

J46. GBD 2019 Diseases and Injuries Collaborators (methods contributor). *Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019.* The Lancet (2020).

J45. GBD 2019 Universal Health Coverage Collaborators (methods contributor). *Measuring universal health coverage based on an index of effective coverage of health services in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019.* The Lancet (2020).

J44. P. Zheng, A.Y. Aravkin. *Relax-and-split method for nonsmooth nonconvex problems.* Inverse Problems (2020).

J43. K. Champion, P. Zheng, A.Y. Aravkin, S.L. Brunton, J.N. Kutz. *A unified sparse optimization framework to learn parsimonious physics-informed models from data.* IEEE Access 8 (2020): 169259-169271.

J42. A. Mendible, S.L. Brunton, A.Y. Aravkin, W. Lowrie, J.N. Kutz. *Dimensionality Reduction and Reduced Order Modeling for Traveling Wave Physics.* Theoretical and Computational Fluid Dynamics (2020): 1-16.

J41. J. Zhang, A.M. Pace, S.A. Burden, A.Y. Aravkin. *Offline state estimation for hybrid systems via nonsmooth variable projection.* Automatica 115 (2020): 108871.

J40. N.B. Erichson, P. Zheng, K. Manohar, S.L. Brunton, J.N. Kutz, A. Aravkin. *Sparse Principal Component Analysis via Variable Projection.* SIAM Applied Mathematics, 80.2 (2020): 977-1002. 2020.

J39. J. Zhang, T. Leung, A.Y. Aravkin. *Sparse Mean-Reverting Portfolios via Penalized Likelihood Optimization.* Automatica 111 (2020): 108651.

J38. R. Baraldi, R. Kumar, A.Y. Aravkin. *Basis Pursuit Denoise with Nonsmooth Constraints.* To appear in IEEE Transactions of Signal Processing, 2019.

J37. R. Baraldi, C. Ulberg, R. Kumar, K. Creager, A.Y. Aravkin. *Relaxation algorithms for matrix completion, with applications to seismic travel-time data interpolation.* Inverse Problems 35.10 (2019): 105009.

J36. J. Jonker, A. Aravkin, J. Burke, G. Pillonetto, S. Webster. *Fast methods for robust singular state-space models.* Automatica 105 (2019): 399-405.

J35. A. Aravkin, G. Bottegal, G. Pillonetto. Boosting as a kernel-based method. Machine Learning (2019): 1-24.

J34. A. Aravkin and D. Davis. *Trimmed Statistical Estimation via Variance Reduction.* Mathematics of Operations Research (2019).

J33. P. Zheng, T. Askham, S.L. Brunton, J.N. Kutz, A.Y. Aravkin. *A Unified Framework for Sparse Relaxed Regularized Regression: SR3.* IEEE Access, DOI 10.1109/ACCESS.2018.2886528.

J32. D. Driggs, S. Becker, A. Aravkin. *Adapting Regularized Low Rank Models for Parallel Architectures.* SIAM Journal of Scientific Computing (SISC), 41.1 (2019): A163-A189.

J31. M. Liu, R. Kumar, E. Haber, A.Y. Aravkin. *Simultaneous shot inversion for nonuniform geometries using fast data interpolation.* Inverse Problems 35 (2), 2018.

J30. A. Aravkin, J. Burke, D. Drusvyatskiy, M. Friedlander, S. Roy. *Level-set methods for convex optimization.* Math. Program. (2018). https://doi.org/10.1007/s10107-018-1351-8

J29. E. Yang, A. Lozano, A. Aravkin. *High-Dimensional Trimmed Estimators: A General Framework for Robust Structured Estimation.* Electron. J. Statist., 12(2) (2018), 3519-3553.

J28. A. Aravkin, J. Burke, G. Pillonetto. *Generalized system identification with stable spline kernels.* SIAM Journal on Scientific Computing 40.5 (2018): B1419-B1443.

J27. A. Aravkin, J. Burke, D. Drusvyatskiy, M. Friedlander, K. MacPhee. *Foundations of Gauge and Perspective Duality.* SIAM Journal on Optimization 28.3 (2018): 2406-2434.

J26. U. Diala, R. Wennberg, I. Abdulkadir Z. Farouk, C. Zabetta, E. Omoyibo A. Emokpae, A. Aravkin, B. Toma, S. Oguche, T. Slusher. *Patterns of acute bilirubin encephalopathy in Nigeria: a multicenter pre-intervention study.* Journal of Perinatology (2018):1 (D-8).

J25. M. Liu, R. Kumar, E. Haber, A. Aravkin. *Simultaneous-shot inversion for PDE-constrained optimization problems with missing data.* Inverse Problems, 35(2):025003, December 2018.

J24. E. Esser, L. Guasch, T. van Leeuwen, A.Y. Aravkin, F.J. Herrmann. *Total-variation regularization strategies in full-waveform inversion.* SIAM Journal on Imaging Sciences, 11(1), 376-406 (2018).

J23. A. Aravkin, D. Drusvyatskiy, T. van Leeuwen. *Efficient quadratic penalization through the partial minimization technique.* IEEE Transactions on Automatic Control, 2017 (D-8).

J22. A. Aravkin, J.V. Burke, L. Ljung, A. Lozano, and G. Pillonetto. *Generalized Kalman Smoothing: Modeling and Algorithms (Survey).* Automatica, Vol. 86, 2017, p. 63-86.

J21. R. Kumar, O. Lopez, D. Davis, A. Aravkin, F. Herrmann *Beating level-set methods for 3D seismic data interpolation: a primal-dual alternating approach.* To appear in IEEE Transactions on Computational Imaging (TCI), 2017 (D-11).

J20. Y. Kim, A. Aravkin, H. Fei, A. Zondervan, M. Wolf. *Analytics for understanding customer behavior in the energy and utility industry.* IBM Journal of Research and Development. 60(1), 11-1, 2016 (D-13).

J19. N. Tu, A. Aravkin, T. van Leeuwen, T. Lin, F. Herrmann. *Source estimation with surface-related multiples – fast ambiguity resolved seismic imaging.* Geophysical Journal International, 205.3(2016): 1492-1511.

J18. G. Bottegal, A. Aravkin, H. Hjalmarsson and G. Pillonetto. *Robust EM kernel-based methods for linear system identification.* Automatica 67 (2016) 114-126.

J17. R. Kumar, C. Da Silva, O. Akalin, A. Aravkin, H. Mansour, B. Recht, F. Herrmann. *Efficient matrix completion for seismic data reconstruction.* Geophysics 80, no. 5 (2015): V97-V114.

J16. A. Aravkin, B. Bell, J. Burke, and G. Pillonetto. *The connection between Bayesian estimation of a Gaussian random field and RKHS.* in Neural Networks and Learning Systems, IEEE Transactions on, vol.26, no.7, pp.1518-1524, July 2015.

J15. I. Iskander, R. Gamaleldin, S. El Houchi, A. El Shenawy, I. Seoud, N. El Gharbawi, H. Abou-Youssef, A. Aravkin, and R. Wennberg, *Serum bilirubin and bilirubin/albumin ratio as predictors of bilirubin encephalopathy.* Pediatrics, DOI: 10.1542/peds.2013-1764, 2014.

J14. A. Aravkin, R. Kumar, H. Mansour, B. Recht, and F. Herrmann. *Fast methods for denoising matrix completion formulations, with applications to robust seismic data interpolation.* SIAM J. Sci. Comput., 36(5):S237-S266, 2014.

J13. A. Aravkin, J. Burke, G. Pillonetto. *Robust and trend following Student's t Kalman smoothers.* SIAM J. Control Optim., 52(5):2891-2916, 2014.

J12. A. Aravkin, J. Burke, A. Chiuso, and G. Pillonetto. *Convex vs. nonconvex approaches for sparse estimation: the mean squared properties of ARD and GLasso.* Journal of Machine Learning Research (JMLR), Volume 15, pages 217-252, 2014.

J11. A. Aravkin, J. Burke, and G. Pillonetto. *Sparse/Robust Estimation and Kalman Smoothing with Nonsmooth Log-Concave Densities: Modeling, Computation, and Theory.* Journal of Machine Learning Research (JMLR), Volume 3, pages 2689-2728, September 2013.

J10. A. Aravkin, J. Burke, M. Friedlander. *Variational Properties of Value Functions.* SIAM Journal of Optimization (SIOPT), Vol. 23, No. 3, pp. 1689-1717, August 2013.

J9. C.L. Wang, M.J. Eissa, J. Rogers, A. Aravkin, B.A. Porter, J.D. Beatty. *(18)F-FDG PET/CT-Positive Internal Mammary Lymph Nodes: Pathologic Correlation by Ultrasound-Guided Fine-Needle Aspiration and Assessment of Associated Risk Factors.* AJR Am J Roentgenol. 2013 May; 200(5): 1138-1144.

J8. A. Aravkin, T. van Leeuwen. *Estimating Nuisance Parameters in Inverse Problems,* Inverse Problems, 28(11):115016, October 2012 (S-14).

J7. A. Aravkin, M. Friedlander, F. Herrmann, and T. van Leeuwen. *Robust Inversion, Dimensionality Reduction, and Randomized Sampling,* Math. Prog., 34 (1), 101-125, 2012.

J6. X. Li, A. Aravkin, T. van Leeuwen, and F. Herrmann, *Fast randomized full-waveform inversion with compressive sensing,* Geophysics 77(3), A13-A17, 2012.

J5. T. van Leeuwen, A. Aravkin, and F. Herrmann, *Seismic waveform inversion by stochastic optimization,* International Journal of Geophysics, vol. 2011, (S-18).

J4. A. Aravkin, B. Bell, J. Burke, G. Pillonetto, *An ℓ_1-Laplace Robust Kalman Smoother,* IEEE Transactions of Automatic Control (TAC), 56(12):2898-2911, 2011.

J3. R. Gammeldin, I. Iskander, I. Seoud, H. Aboraya, A. Aravkin, P. Sampson, R. Wennberg, *Risk Factors of Neurotoxicity in Newborns with Severe Neonatal Hyperbilirubinemia.* Pediatrics 128(4), 2011, e925-e931.

J2. C. Wang, L. MacDonald, J. Rogers, A. Aravkin, D. Haseley, J. Beatty, *Positron emission mammography: correlation of estrogen receptor, progresterone receptor, and human epidermal growth factor receptor 2 status and 18F-FDG.* AJR Am J Roentgenol. 2011 Aug; 197(2): W247-55.

J1. R. Wennberg, C. Ahlfors and A. Aravkin, *Intervention guidelines for neonatal hyperbilirubinemia: an evidence based quagmire.* Curr. Pharm. Design 2009; 15(25):2939-45.

PEER REVIEWED
CONFERENCE
PROCEEDINGS

C52. A.Y. Aravkin, J.V. Burke, B.M. Bell, G. Pillonetto. *Kalman smoothing and block tridiagonal systems: new connections and stability results.* To appear in the 19th IFAC Symposium on System Identification (SYSID 2021), Accepted 2021.

C51. A. Scampicchio, A.Y. Aravkin, G. Pillonetto. *Stable and Robust LQR Design via Scenario Approach.* IFAC-PapersOnLine, Volume 53, Issue 2, 2020, Pages 5556-5560.

C50. J. Jonker, A. Shcherbina, R. Krishfield, L. Van Uffelen, A.Y. Aravkin, S. Webster. *Preliminary Results in Current Profile Estimation and Doppler-aided Navigation for Autonomous Underwater Gliders.* In OCEANS 2019-Marseille, pp. 1-8. IEEE, 2019.

C49. J. Jonker, A.Y. Aravkin, J.V. Burke, G. Pillonetto, S. Webster. *Robust Singular Smoothers For Tracking Using Low-Fidelity Data.* Proceedings of Robotics: Science and Systems (RSS), 2019. http://roboticsproceedings.org/rss15/p37.pdf

C48. J. Yun, P. Zheng, E. Yang, A. Lozano, A.Y. Aravkin. *Trimming the ℓ_1 Regularizer: Statistical Analysis, Optimization, and Applications to Deep Learning.* In International Conference on Machine Learning, pp. 7242-7251. PMLR, 2019.

C47. J. Zhang, T. Leung, A.Y. Aravkin. *A relaxed optimization approach for cardinality-constrained portfolios.* In 2019 18th European Control Conference (ECC), pp. 2885-2892. IEEE, 2019.

C46. J. Zhang, T. Leung, and A. Aravkin. *Mean Reverting Portfolios via Penalized OU-Likelihood Estimation.* In 2018 IEEE Conference on Decision and Control (CDC), pp. 5795-5800. IEEE, 2018.

C45. P. Zheng, A. Aravkin, K. Ramamurthy, J.J. Thiagarajan. *Learning robust representations for computer vision.* Proceedings of RCL-CV 2017/ICCV 2017 (D-8).

C44. K. Ramamurthy, C.C. Lin, A.Y. Aravkin, S. Pankanti, R. Viguier. *Distributed Bundle Adjustment.* Proceedings of UAVision 2017/ICCV 2017 (D-8).

C43. G. Pillonetto, A. Aravkin. *A stable spline convex approach to hybrid system identification.* Machine Learning and Signal Processing (MLSP) Proceedings, 2016 (D-6).

C42. A. Aravkin, K. Varshney, L. Yang. *Dynamic matrix factorization with social influence.* MLSP Proceedings, 2016 (D-6).

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C41. K.N. Ramamurthy, A. Aravkin, J. J. Thiagarajan. *Beyond L2-loss functions for learning sparse models.* IEEE Conf. Acoust., Speech, and Signal Proc. (ICASSP), 2016, p. 4692-4696.

C40. C-C Lin, S. Pankanti, K. Ramamurthy, and A. Aravkin. *Adaptive As-Natural-As-Possible Image Stitching.* In Proceedings of the IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 1155-1163. 2015.

C39. G. Bottegal, H. Hjalmarsson, A.Y. Aravkin, G. Pillonetto. *Outlier Robust Kernel-Based System Identification Using L1-Laplace Techniques.* In Proceedings of IEEE Conf. Decision and Control (CDC) (2015), p. 2109-2114.

C38. S. Becker, L. Horesh, A. Aravkin, S. Zhuk. *General Optimization Framework for Robust and Regularized 3D Full Waveform Inversion.* In EAGE Technical Program Expanded Abstracts, 2015 (D-4).

C37. E. Esser, L. Guasch, T. van Leeuwen, A. Aravkin, and F. Herrmann. *Automatic salt delineation — Wavefield Reconstruction Inversion with convex constraints.* In SEG Technical Program Expanded Abstracts 2015, edited by Robert Vincent Schneider, pp. 1337-1343.

C36. S. Zhuk, S. Moore, A. Nogueira, A. Rawlinson, T. Tchrakian, L. Horesh, A. Aravkin and A. Akhriev. *Source estimation for wave equation with uncertain parameters.* In European Control Conference (ECC) 2015, p. 266-270.

C35. A. Aravkin, S. Becker, V. Cevher, and P. Olsen. *A variational approach to stable principal component pursuit.* In 30th Conf. on Uncertainty in Artificial Intelligence (UAI), no. EPFL-CONF-199542. 2014 (D-10).

C34. H. Wason, R. Kumar, A. Aravkin, and F. J. Herrmann. *Source separation via SVD-free rank minimization in the hierarchical semi-separable representation.* SEG Annual Meeting, 2014 (D-4).

C33. O. Tripp, S. Guarnieri, M. Pistoia and A. Aravkin. *Aletheia: improving the usability of static security analysis.* Proceedings of the 2014 ACM SIGSAC on Computer and Communications Security, 762-774.

C32. A. Aravkin, K.N. Ramamurthy, and G. Pillonetto. *Kalman Smoothing With Persistent Nuisance Parameters.* MLSP Proceedings, 2014 (D-6).

C31. G. Pillonetto and A. Aravkin. *A New Kernel-Based Approach For Identification Of Time-Varying Linear Systems.* MLSP Proceedings, IEEE, 2014 (D-6).

C30. A. Aravkin and J. Burke. *Smoothing dynamic systems with state-dependent covariance matrices.* In CDC, 53rd Annual Conf. on, pp. 3382-3387. IEEE, 2014.

C29. A. Aravkin, A. Kambadur, A. C. Lozano, and R. Luss. *Orthogonal Matching Pursuit for Sparse Quantile Regression.* Intern. Conf. on Data Mining (ICDM), pp. 11-19. IEEE, 2014.

C28. R. Kumar, A. Aravkin, E. Esser, H. Mansour and F. Herrmann. *SVD-free low-rank matrix factorization : wavefield reconstruction via jittered subsampling and reciprocity.* Proceedings of the EAGE, 2014 (D-4).

C27. G. Bottegal, A. Aravkin, H. Hjalmarsson and G. Pillonetto. *Outlier robust system identification: a Bayesian kernel-based approach.* In IFAC World Cong. (19), p. 1073-1078, 2014.

C26. D. Malioutov, A. Aravkin. *Iterative log thresholding.* In Acoustics, Speech and Signal Processing (ICASSP), International Conf. on, pp. 7198-7202. IEEE, 2014.

C25. E. Khan, A. Aravkin, M. Friedlander, and M. Seeger. *Fast dual variational inference for non-conjugate latent Gaussian models.* JMLR W&CP 28(3):951-959, 2013.

C24. T. Sainath, L. Horesh, B. Kingsbury, A. Aravkin, B. Ramabhadran. *Accelerating Hessian-free optimization for deep neural networks by implicit preconditioning and sampling.* In Proc. on Automatic Speech Recognition and Understanding (ASRU), pp. 303-308. IEEE, 2013.

C23. T. Sainath, B. Kingsbury, A. Mohamed, G. Dahl, G. Saon, H. Soltau, T. Beran, A. Aravkin, B. Ramabhadran. *Improvements for deep convolutional neural networks for LVCSR.* In Proc. on Automatic Speech Recognition and Understanding (ASRU), pp. 315-320. IEEE, 2013.

C22. A. Aravkin, J. Burke and G. Pillonetto. *Linear system identification using stable spline kernels and PLQ penalties.* In CDC, 52nd Annual Conf. on, pp. 5168-5173. IEEE, 2013.

C21. R. Kumar, H. Mansour, A. Aravkin, and F. Herrmann. *Reconstruction of seismic wavefields via low-rank matrix factorization in the HSS matrix representation.* Proc. of the SEG, 2013 (D-4).

C20. A. Aravkin, T. van Leeuwen and N. Tu. *Sparse seismic imaging using variable projection.* In Acoustics, Speech and Signal Processing (ICASSP), Int. Conf. on, 2065-2069. IEEE, 2013.

C19. T. van Leeuwen, A. Aravkin, H. Calandra, and F. Herrmann. *Which domain for robust full waveform inversion?* In Proceedings of the EAGE, 2013 (D-4).

C18. A. Aravkin, J. Burke and G. Pillonetto. *Nonsmooth regression and state estimation using piecewise quadratic log-concave densities.* In Proc. of IEEE Conf. CDC 2012, p. 4101-4106.

C17. F. Herrmann, X. Li, A. Aravkin, and T. van Leeuwen. *A modified, sparsity promoting, Gauss-Newton algorithm for seismic waveform inversion.* In SPIE Optical Engineering+ Applications, pp. 81380V-81380V. International Society for Optics and Photonics, 2011.

C16. A. Aravkin, J. Burke, A. Chiuso, G. Pillonetto, *Convex vs. nonconvex approaches for sparse estimation: Lasso, Multiple Kernel Learning and Hyperparameter Lasso.* In Decision and Control and European Control Conf. (CDC-ECC), 50th Conf. on, pp. 156-161. IEEE, 2011.

C15. A. Aravkin, T. van Leeuwen, K. Bube and F. Herrmann. *On non-uniqueness of the Student's t formulation for linear inverse problems.* In Proceedings of the SEG, 2012 (D-4).

C14. A. Aravkin, M. Styer, Z. Moratto, A. Nefian, and M. Broxton. *Student's t robust bundle adjustment algorithm.* In Image Processing (ICIP), 19th International Conf. on, pp. 1757-1760. IEEE, 2012.

C13. A. Aravkin, J. Burke, A. Chiuso and G. Pillonetto. *On the MSE Properties of Empirical Bayes Methods for Sparse Estimation.* In IFAC Sys, Id, Volume 16 (1), p. 965-970, 2012.

C12. A. Aravkin, J. Burke, and G. Pillonetto. *Robust and Trend-following Kalman smoothers using Student's t.* In IFAC Sys. Id, Vol. 16 (1) p. 1215–1220, 2012.

C11. A. Aravkin, J. Burke, and G. Pillonetto. *A statistical and computational theory for robust and sparse Kalman smoothing.* In IFAC Sys Id, Volume 16 (1), 894–899, 2012.

C10. A. Aravkin, J. Burke, A. Chiuso and G. Pillonetto. *On the estimation of hyperparameters for Empirical Bayes estimators: Maximum Marginal Likelihood vs Minimum MSE.* In IFAC Sys Id, Vol. 16 (1), p. 125-130, 2012.

C9. A. Aravkin, X. Li, and F. Herrmann. *Fast seismic imaging for marine data.* In Acoustics, Speech and Signal Processing (ICASSP), International Conf. on, pp. 2517-2520. IEEE, 2012.

C8. A. Aravkin, M. Friedlander, and T. van Leeuwen. *Robust inversion via semistochastic dimensionality reduction.* ICASSP, pp. 5245-5248. IEEE, 2012.

C7. A. Aravkin, T. van Leeuwen, H. Calandra, and F. Herrmann. *Source estimation for frequency-domain FWI with robust penalties.* 74th Annual International Conf. and Exhibition, EAGE. In Extended Abstracts, p. P018. 2012 (D-4).

C6. X. Li, A. Aravkin, T. van Leeuwen, F. Herrmann, *Modified Gauss-Newton with Sparse Updates.* Proc. Brazilian Geophysical Society (SBGF) 2011 (D-4).

C5. A. Aravkin, T. van Leeuwen, F. Herrmann, *Robust full-waveform inversion using the Student's t-distribution*, SEG Expanded Abstracts 30, 2669, 2011 (D-4).

C4. A. Aravkin, T. van Leeuwen, J. Burke, F. Herrmann, *A nonlinear sparsity promoting formulation and algorithm for full waveform inversion*, EAGE Expanded Abstracts 2011 (D-4).

C3. X. Li, A. Aravkin, T. van Leeuwen, F. Herrmann, *Full-waveform inversion with randomized L1 recovery for the model updates.* EAGE Expanded Abstracts 2011 (D-4).

C2. A. Aravkin, B. Bell, J. Burke, G. Pillonetto, *Learning Using State Space Kernel Machines*, In World Congress, vol. 18, no. 1, pp. 2296-2302. 2011.

C1. G.Pillonetto, A. Aravkin, S. Carpin, *The unconstrained and inequality constrained moving horizon approach to robot localization.* Proceedings of the 2010 IEEE/RSJ International Conf. on Intelligent Robots and Systems, 3830-3835.

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Talks and
Presentations

T90. Invited talk: SIAM Optimization 2021, *Relax and Split Method for Nonconvex Optimization.* Scheduled for Friday, July 23, 2021, Virtual.

T89. Invited talk: 19th IFAC Symposium on System Identification (SYSID 2021), *Kalman smoothing and block tridiagonal systems: new connections and stability results..* Scheduled for Friday, July 15, 2021. Virtual.

T88. Invited talk: CRM Applied Math seminar, McGill University, *A Tale of Two Models for COVID-19 Scenarios.* April 12th, 2021, Virtual.

T87. Invited talk: Towards a Robust Evidence Score In Global Health. Canadian Mathematical Society, December 2020, Virtual.

T86. Invited talk: Towards a Robust Evidence Score In Global Health. Machine Learning Deep Dive, November 2020, University of Washington, Seattle, WA.

T85. Invited talk: Panelist on Covid-19 Panel, International Symposium on Forecasting. October 2020, Virtual.

T84. Invited talk: Towards a Robust Evidence Score In Global Health. Metrics Seminar. March 2020, Stanford University, Stanford, CA.

T83. Invited talk: Robust Mixed Effects Models for Network Analysis. GBD Science Seminar Series, Institute of Health Metrics and Evaluation. January 2020, Seattle, WA.

T82. Invited talk: Towards a Robust Evidence Score Model in Global Health. IBM TJ Watson Research Center, December 2019, NY.

T81. Invited talk: New Ideas in Quantitative Finance Workshop. Stonybrook University, November 2019, NY.

T80. Invited talk at West Coast Optimization Meeting: Meta-analysis with applications to global health. Vancouver, BC September 2019.

T79. Invited talk at ICIP (Stochastic Programming): New Methods for Nonsmooth Nonconvex Problems. Trondheim, Norway, August 2019.

T78. Invited talk at Applied Mathematics: the Next 50 Years. Seattle, WA, June 2019: Towards a Robust Evidence Score for Global Health Applications.

T77. Invited talk at Physics Informed Machine Learning Workshop, Seattle, WA, June. 2019: Nonsmooth Nonconvex Problems in Data-Driven Discovery.

T76. Invited talk at PIMS Workshop for Computational Math in Renewable Energy. UBC, Vancouver BC, May 2019: Robust Time Series Models.

T75. Chair of Finance Session, at the Conference on Decision and Control, Miami Beach, Florida, Dec. 2018.

T74. Invited talk at Joint Statistical Meetings, *Robust Time Series Using Exponential Smoothing Cells*, Vancouver BC, 2018.

T73. Invited talk at UBC, *Fast Methods for Nonsmooth, Nonconvex problems*, Vancouver BC, 2018.

T72. Summer School Lecture on Optimization, UBC, Vancouver BC, 2018.

T71. Invited talk at SIAM Annual Meeting. *Fast Methods for Nonsmooth, Nonconvex Problems.* Portland, 2018.

T70. Invited talk at Microsoft Research. *Fast Methods for Nonsmooth, Nonconvex Problems.* Seminar, 2018.

T69. Invited talk at TU Munchen, Mathematics Institute on the Garching Campus, *Fast Methods for Nonsmooth, Nonconvex Problems.* Munich, 2018.

T68. Invited talk at LANS Seminar (Argonne National Labs), *Fast Methods for Nonsmooth, Nonconvex Problems.* Illinois, 2018.

T67. Invited talk at SAMSI Workshop on Operator Splitting Methods in Data Analysis, *Fast methods for nonsmooth, nonconvex problems.* Raleigh, 2018.

T66. Invited talk at Amazon, *Fast Seattle, 2018. Fast Algorithms for Robust Applications in Machine Learning and Time Series.* Seattle, 2018.

T65. Banff Research Center, *Unified optimization for self-learning robust penalties.*. Banff, 2018.

T64. Invited presentation at EUROPT, Montreal, July 2017.

T63. Talk at SIAM Optimization, Vancouver BC, May 2017.

T62. Invited UW talk at Statistics Seminar, April 21st, 2017.

T61. Invited Talk at Google Seattle, April 6th, 2017.

T60. Invited Talk at Google NYC, March 24th, 2017.

T59. Invited UW talk: *Robust statistics and learning via optimization*, at Industrial and Systems Engineering, February 2017.

T58. Invited UW talk: *Robust statistics and learning via optimization*, at Computational Finance Microsoft Seminar Series, January 2017.

T57. Invited UW talk: *Robust statistics and learning via optimization*, at Applied and Computational Mathematical Sciences (ACMS) seminar, January 2017.

T56. Invited UW talk: *Robust Formulations for Learning Problems*, at eScience Community Seminar, October 2016.

T55. Invited talk: *Fast Algorithms for Robust Machine Learning*, Google NYC, July 2016.

T54. Invited talk: *Variational Projection and Applications*, Workshop on Nonlinear Optimization Algorithms and Industrial Applications FIELDS Institute, June 2016.

T53. SIAM Optimization: *Variable Projection in Nonsmooth Applications*, Boston MA, July 2016.

T52. Invited talk: *Variational Projection with Applications*, Canadian Operations Research Society (CORS), June 2016.

T51. Invited tutorial: *Modeling and Optimization in Machine Learning*, Optimization Days, Montreal, Canada, May 2016.

T50. Invited talk: *Conjugate Interior Point Methods for Large-Scale Problems*, West Coast Optimization Meeting, University of Washington, 2016.

T49. Invited talk: *Conjugate Interior point method for large-scale problems*, University of Padova, Italy, April 2016.

T48. Invited talk: *Conjugate Interior Point Method for Large-Scale Nonsmooth Problems*, Institute for Systems Biology (ISB), Seattle, April 2016.

T47. Invited talk: *Conjugate Interior Point Method for Large-Scale Nonsmooth Problems*, Institute of Mathematics and Applications, Minneapolis, MA, January 2016.

T46. Invited UW talk: *Variable projection and applications.* Applied Math Seminar, December 2015.

T45. Invited talk: *Variable projection and applications*, University of British Columbia, December 2015.

T44. Invited talk: *Variable projection and applications*, IBM T.J. Watson Research Center, November 2015.

T43. Invited talk: *Conjugate Interior Point Method for Large-Scale Nonsmooth Problems*, EPFL Lausanne, June 2015.

T42. EAGE Madrid, *A general optimization framework for 3D full waveform inversion*, Madrid, Spain, June 2015.

T41. Invited talk: *A Conjugate Interior Point Approach for Large-Scale Problems*, Pittsburg, PA, June 2015.

T40. Invited talk: *Optimization perspective on Kalman filtering and smoothing*, Utrecht University, Netherlands, June 2015.

T39. Invited tutorial: *High-dimensional data analysis*, IBM T.J. Watson Research Center, Yorktown Heights NY, May 2015.

T38. Invited talk: *Fast Flipped Algorithms for Inference on Big Data*, Columbia CS, March 2015.

T37. SIAM Comp Science & Engineering, *Matrix free interior point methods*, in Salt Lake City, Utah, March 2015.

T36. Invited talk: *A Conjugate Interior Point approach with applications to machine learning and robust inference for dynamic systems*, Columbia IEOR, February 2015.

T35. Invited talk: *Structured optimization for big data and machine learning*, Columbia Computer Science, February 2015.

T34. Invited talk: *A Conjugate Interior Point approach with applications to machine learning and robust inference for dynamic systems*, University of British Columbia, February 2015.

T33. Invited talk: *Structured optimization for big data and machine learning*, University of Washington, January 2015.

T32. NIPS 2014: *Learning sparse models using general robust losses*, Montreal, Canada, December 2014.

T31. European Utility Week: *Analytics for Renewable Energy*, poster presentation, Amsterdam, Netherlands, November 2014.

T30. Invited talk: *Fast variational methods for matrix completion and robust PCA*, at Sparse Representations, Numerical Linear Algebra, and Optimization Workshop at BIRS, October 2014.

T29. Invited talk: *Optimization perspective on Kalman filtering and smoothing*, GERAD, Montreal Canada, September 2014.

T28. Invited talk: *Optimization for Machine Learning*, ORFE, Princeton, September 2014.

T27. SIAM Optimization: *Fast variational methods for matrix completion and robust PCA*, San Diego, CA, May 2014.

T26. Invited talk: *Optimization perspective on Kalman filtering and smoothing.* Mitsubishi Electric Research Laboratory (MERL), Boston, MA, April 2014.

T25. Invited talk: *Optimization Perspective on Kalman Filtering and Smoothing.* UMass Boston, CS, Boston MA, April 2014.

T24. CISS 2014: *Conjugate Interior Point Method for Large-Scale Nonsmooth Problems*, Princeton, NJ, March 2014.

T23. ICCOPT 2013: *Sparse/robust estimation with nonsmooth log-concave densities*, Lisbon, Portugal, July 2013.

T22. Invited talk: *Piecewise linear quadratic and quadratic support functions in regularized regression, machine learning, system identification, and ESPECIALLY Kalman smoothing.* West Coast Optimization Meeting, University of Washington, May 2013.

T21. Invited talk: *Robust Methods for Large-Scale Inverse Problems*, Courant Institute, New York University, March 2013.

T20. SIAM Comp. Science & Engineering, *4D Seismic with Kalman Smoothing*, February 2013.

T19. CDC 2012, *Nonsmooth regression and state estimation using piecewise quadratic log-concave densities*, December 2012, Maui, HI.

T18. SEG 2012, *On Nonuniqueness of the Student's t formulation for linear inverse problems*, November 2012, Las Vegas.

T17. TOTAL internal conference (Mathias), invited presentation, October 2012, *Estimating nuisance parameters for inverse problems*, Paris.

T16. EAGE 2012, *Source estimation for frequency-domain FWI with robust penalties*, June 2012, Copenhagen, Denmark.

T15. ICASSP 2012, *Fast seismic imaging for marine data*, March 2012, Kyoto, Japan.

T14. ICASSP 2012, *Robust inversion via semistochastic dimensionality reduction*, March 2012, Kyoto, Japan.

T13. INFORMS Annual Meeting, November 16, 2011, *Value Functions: Variational Properties and Applications to Inversion*, Charlotte, NC.

T12. TOTAL internal conference (Mathias), invited presentation, October 2011, *Robust inversion via semistochastic dimensionality reduction*, Paris.

T11. West Coast Optimization Meeting, October 2011, *Fast Robust Seismic Imaging.* Kelowna.

T10. Society of Exploration Geophysics, September 2011, *Robust full-waveform inversion using Student's t-distribution.* San Antonio.

T9. Numerical Aspects of Waves (invited presentation), July 2011, *Robust full-waveform inversion using Student's t-distribution.* Vancouver BC.

T8. SIAM International Council for Industrial and Applied Mathematics (ICIAM), July 2011, *Robust full-waveform inversion using Student's t-distribution.* Vancouver BC.

T7. SIAM ICIAM (invited presentation), July 2011, *Exploiting block tridiagonal structure to design efficient robust Kalman smoothers.* Vancouver, BC.

T6. Applied Mathematics Perspectives 2011: Medical and Seismic Imaging (invited presentation), July 15, *Sparsity promoting formulations and algorithms for FWI.* Vancouver, BC.

T5. European Association of Geoscientists and Engineers, June 2011, *Sparsity promoting formulations and algorithms for FWI.* ViennA.

T4. SIAM Computational Science and Engineering, February 2011, *Full-waveform inversion with compressive updates.* Reno.

T3. Institute for Mathematics and Applications Workshop: Computing with Uncertainty, October 2010, *Robust estimates for discrete-time nonlinear systems.*

T2. West Coast Optimization Meeting 2009, *Robust ℓ_1-Laplace Kalman Smoother.* SFU Surrey.

T1. Lunar Science Conf. 2008, *Bundle Adjustment and Kalman Smoothing*, NASA ARC.